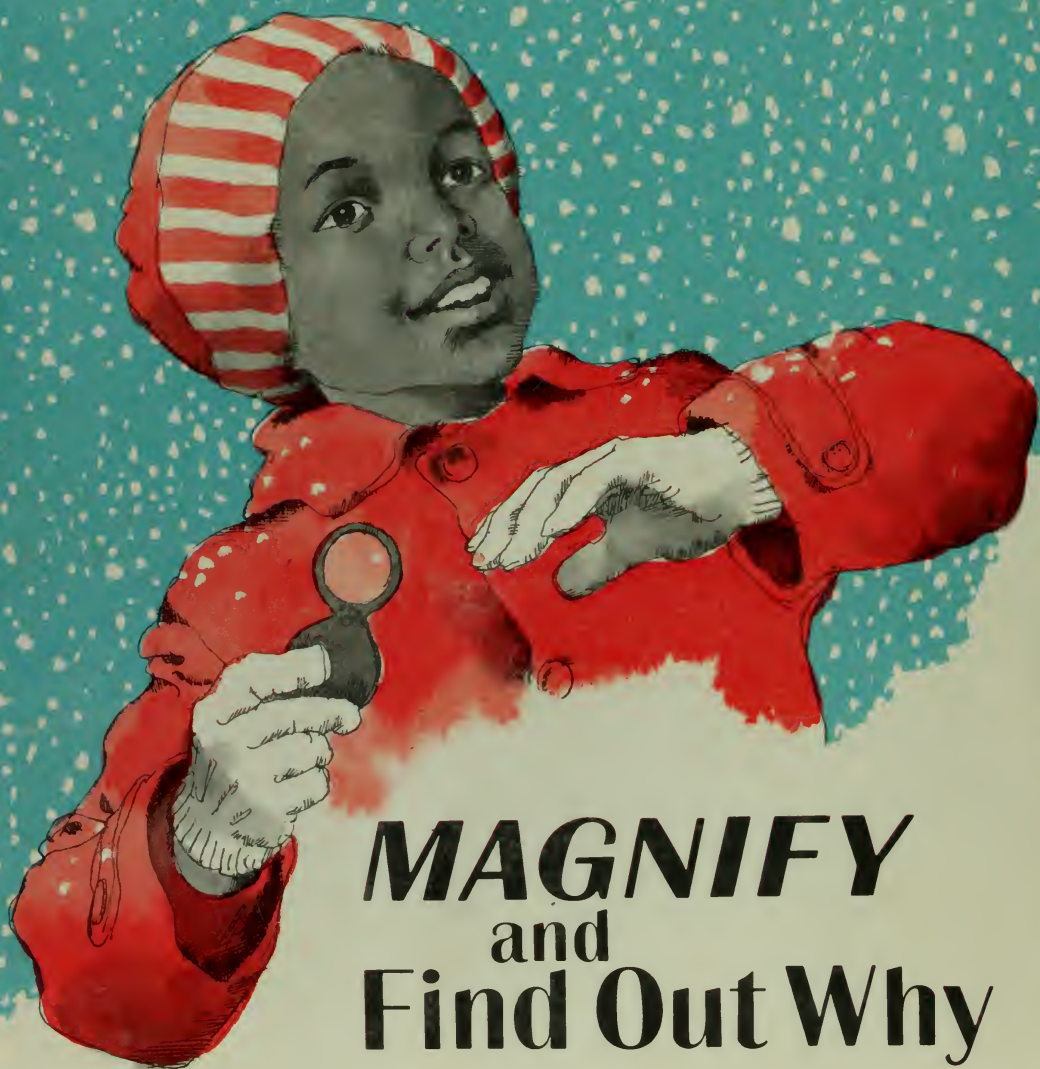


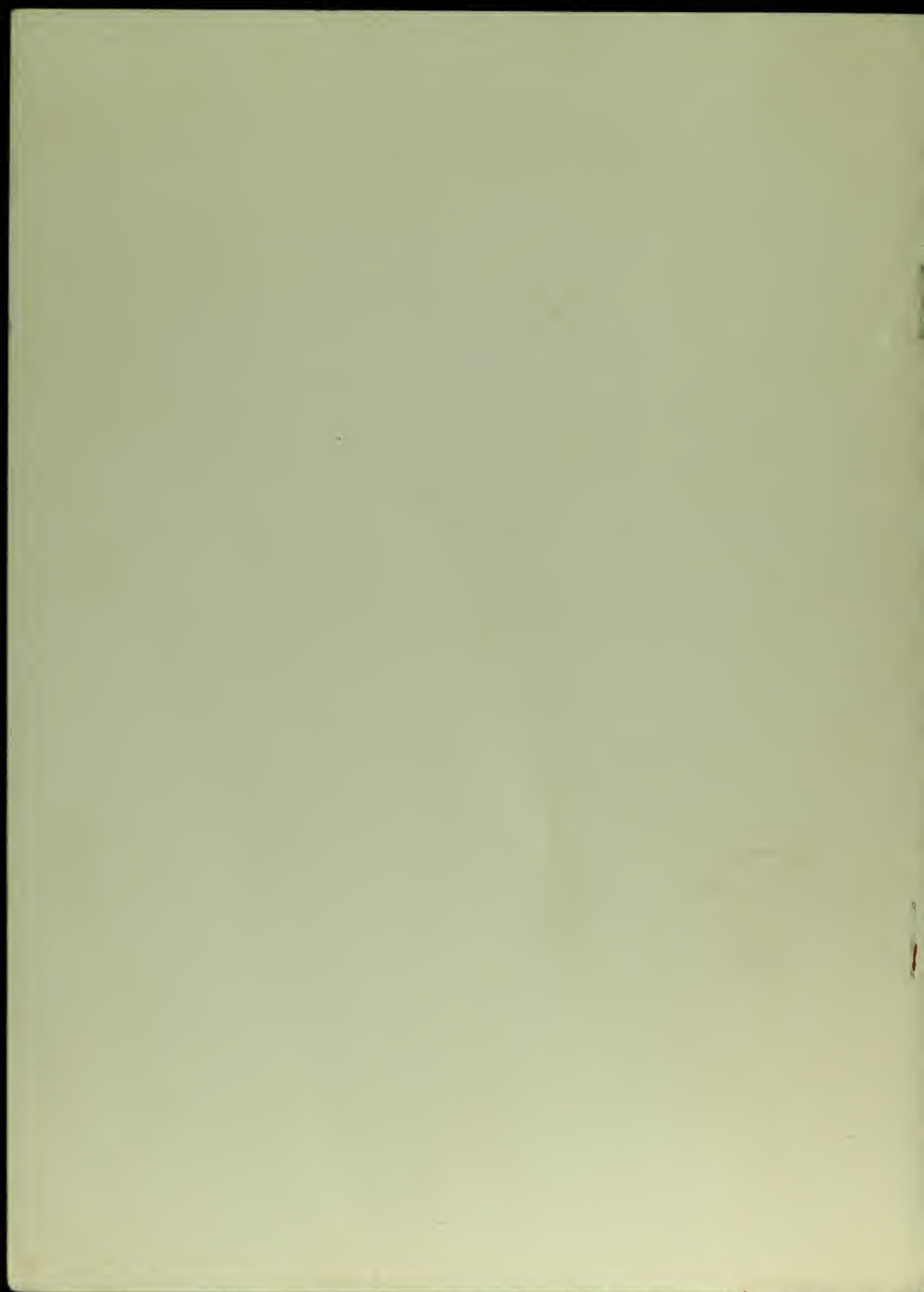


MAGNIFY and **Find Out Why**

by Julius Schwartz

Pictures by Richard Cuffari

TW 2920



William H. H. H. H. H.

MAGNIFY
and
Find Out Why

MAGNIFY

And find out why

And where

And what

And how

MAGNIFY



MAGNIFY and **Find Out Why**

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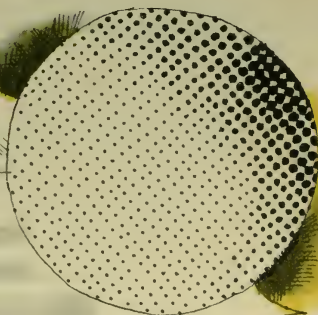
Why Magnify?

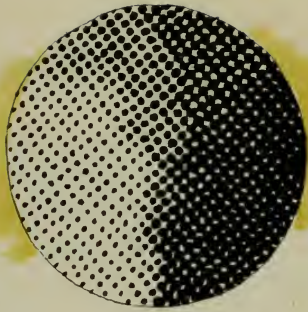
Look at this newspaper picture.
How do you think the white
and gray and dark parts
are made on the paper?

Now look at it again
through a magnifying glass.
Move the glass back and forth,
closer and farther away from the picture,
until it is clear.



Do you see that the white part
is made of tiny black dots and
the gray part is made of bigger dots?





In the darker parts of the picture
the dots are so big
that they touch each other.
In the black parts
the dots run together.

The whole picture is made of dots
of different sizes
printed on the paper.



The magnifying glass helps you know this
because it makes the dots look bigger.
A magnifying glass helps you see things
that you could not see without one.

A magnifying glass helps you find out
why and what and where and how.

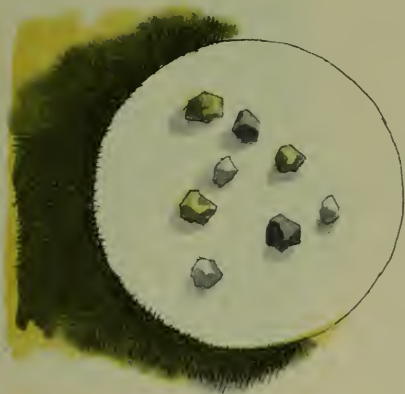
Use your magnifying glass
to find out
about the things around you.



Grains of Sand

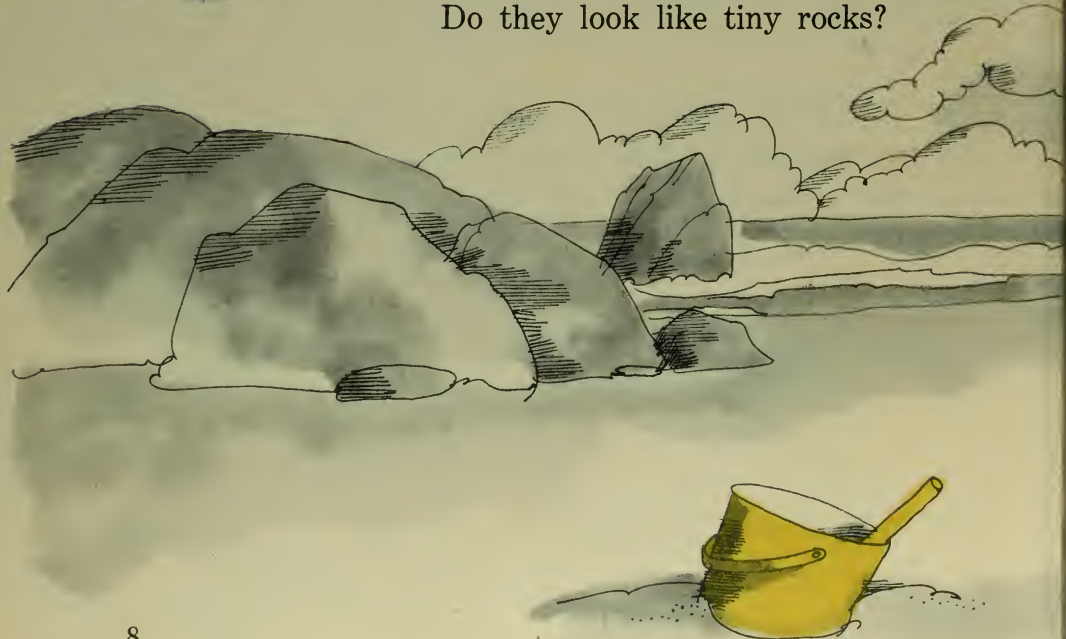
Where does sand come from?
Sprinkle a pinch of sand
on a piece of paper and

MAGNIFY.



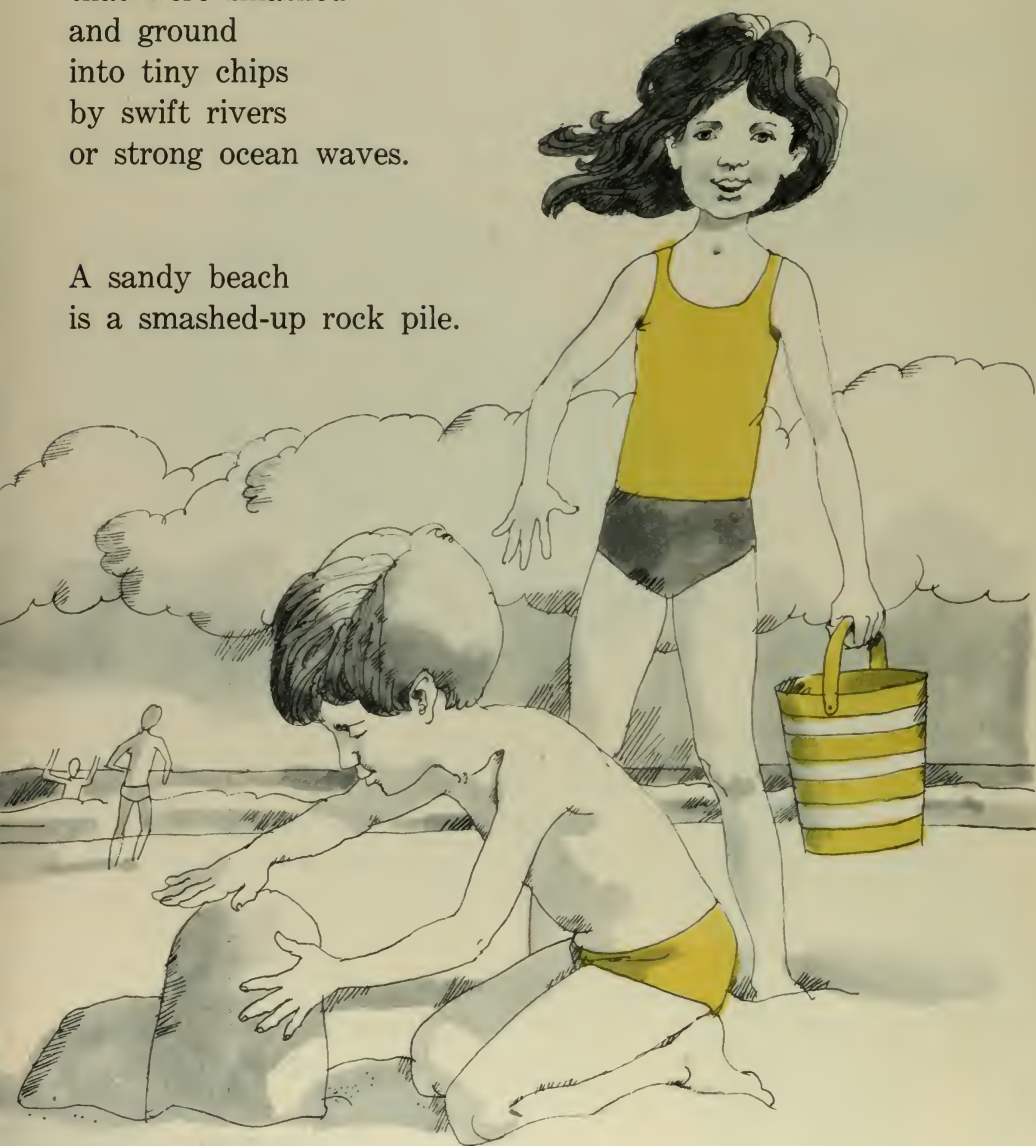
What are the colors of your sand grains?
Are there black grains and white grains,
brown and pink and green ones,
and some glassy grains
with no color at all?

What is the shape of your sand grains?
Do they look like tiny rocks?



Sand grains are bits of big rocks
that were smashed
and ground
into tiny chips
by swift rivers
or strong ocean waves.

A sandy beach
is a smashed-up rock pile.



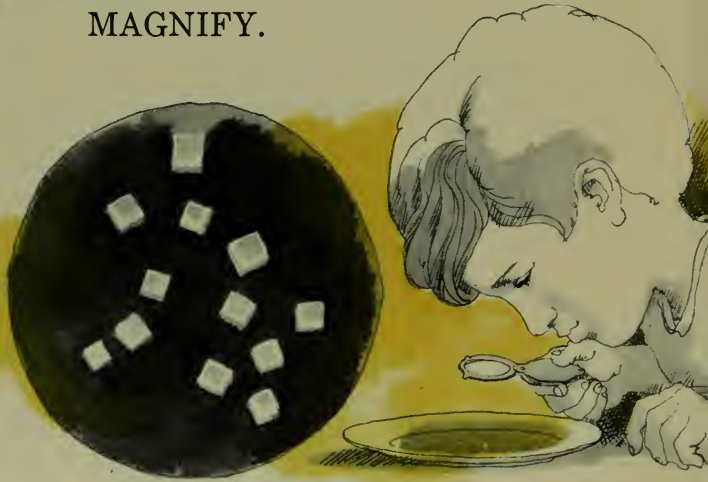
A Pinch of Salt

What is in
a pinch of salt?



Sprinkle some salt
on a clean, dark-colored saucer and

MAGNIFY.



Do you see
dozens of shiny cubes?
These are salt crystals.

Pick up one — just one —
with a wet toothpick
and place it on your tongue.
Can you taste it?



What happens to salt
when you mix it with water?
Drip a few drops of water
on the salt in the saucer and

MAGNIFY.



Each salt crystal
disappears slowly
as it dissolves in the water.

Now taste the water.
Is it salty?

Each salt cube
breaks up
into millions of molecules
that scatter all through the water.





Flakes of Snow

What is the shape of a snowflake?

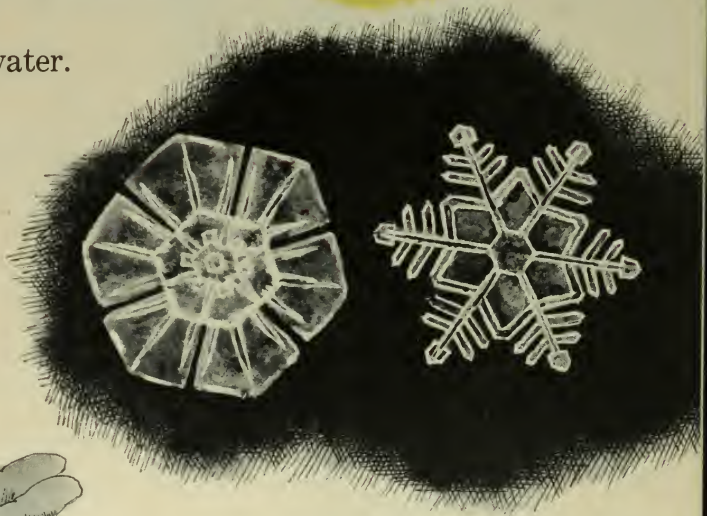
Outside on a winter day
when small snowflakes are falling,
catch some on your coat sleeve and

MAGNIFY.

Don't breathe hard on your magnifying glass
or you may steam it up.
Don't breathe on the snowflakes
or they will melt.

How do they look?
Most snowflakes have six sides
or six spokes.
Many have branches
like a tree.

Each snowflake is different
from every other one.
But when they are warmed,
they all melt
into drops of water.





Bubbles of Air

Is there air in water
for fish to breathe?

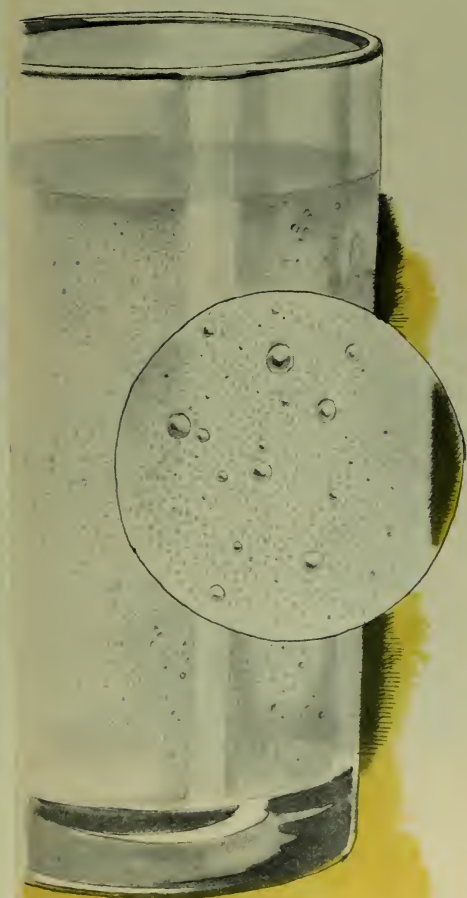
Fill a glass
with cold water from your faucet and

MAGNIFY.



Do you see air in the water?
Let it stand for ten minutes and, again

MAGNIFY.



Now do you see
thousands of air bubbles
on the sides and bottom of the glass?

Look again in half an hour.
How do the bubbles look now?
Are there more?
Are they larger?

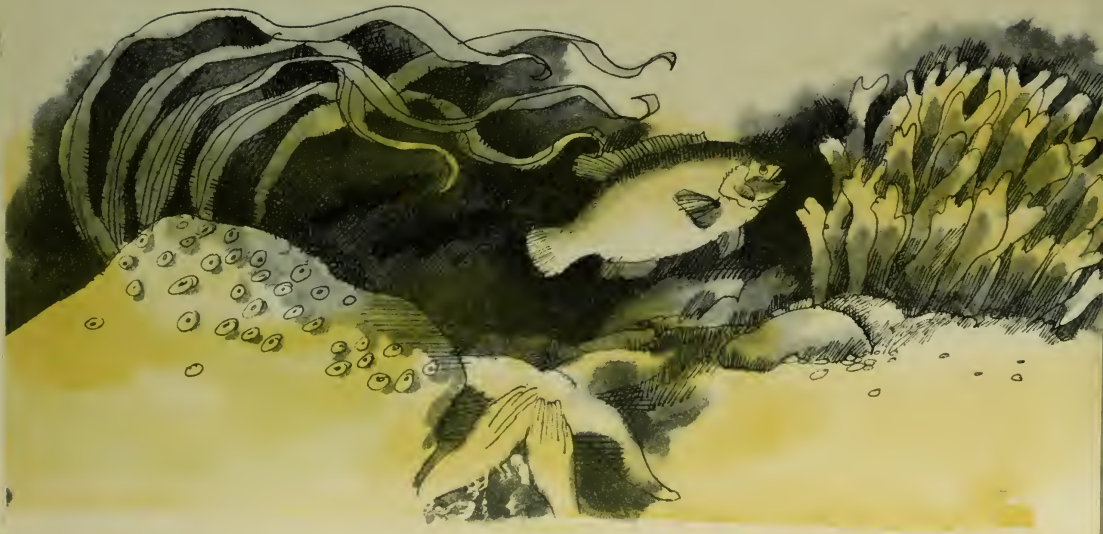
Stir some bubbles with a pencil.
Do they go to the top
and pop
and disappear?



There is air
in the water you drink
and in the water
in ponds
and rivers
and oceans.

This is the air
that fish
and other water animals
breathe.

You found out
how to see the bubbles of air
in the water.





A Spoonful of Soil

What is in the soil
of the forest?
Carefully lift some soil
with a large spoon and

MAGNIFY.

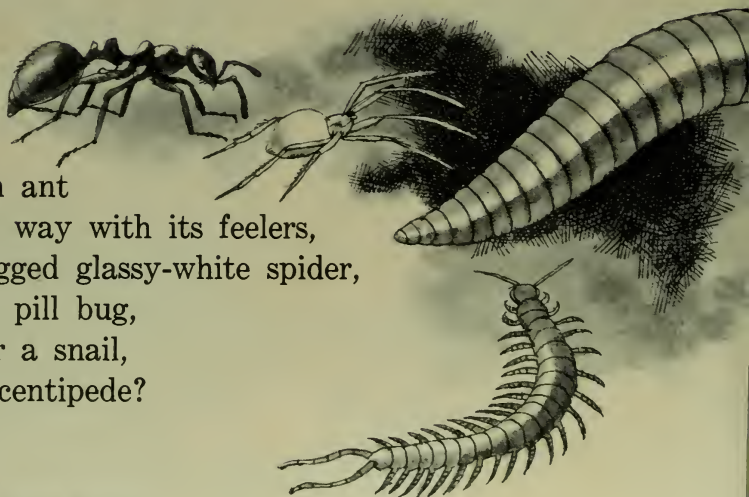


Do you find
shiny pebbles,
a dried-out twisted leaf,
the skeleton veins of another leaf,
a hollow stem of dead grass,
an empty seed
with a hole in it,
a bit of a branch
with a spot of fuzzy yellow mold,
old white root threads?

All rot slowly
and make more soil.

Is there an ant
tapping its way with its feelers,
an eight-legged glassy-white spider,
a rolled-up pill bug,
a worm, or a snail,
perhaps a centipede?

All make their home
in the soil
and help make more soil.



Soil from different places —
from fields, from gardens, from lawns —
is different.

What is in *your* soil?

Slide the soil you collected
into a jar
and cover it.

Watch it at home for a few weeks.
Add a few drops of water now and then
if the soil looks dry.



Do any seeds sprout into new plants?
Do any insects hatch out?

When you have finished,
put the soil back
where it came from.





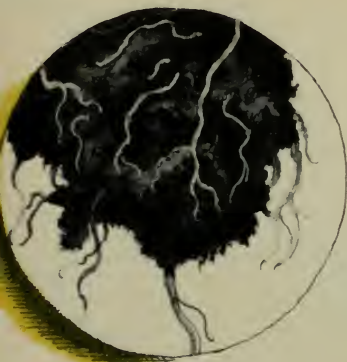
Roots of Grass

How do plant roots
hold on to soil?

Loosen the soil
around one grass plant.
Dig under its roots with a spoon
and carefully lift it up.

Now hold the plant
by its green leaf blade and

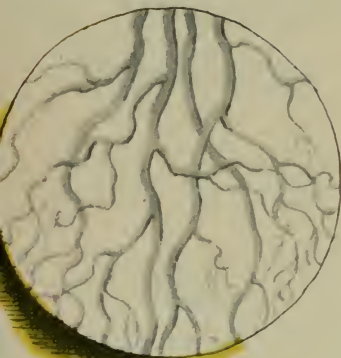
MAGNIFY.



A clump of soil
sticks to the roots.
What makes it stay on?

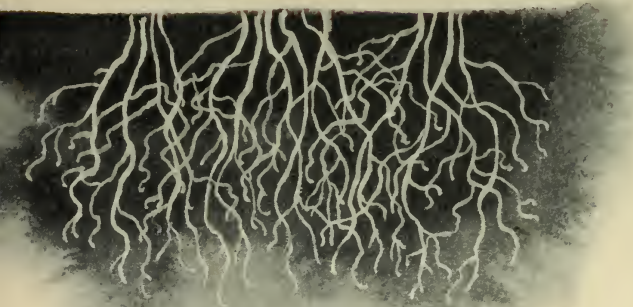
Dip the roots in a glass of water
and shake gently.
Watch the soil fall off
until the roots are bare. Now

MAGNIFY.



The large roots
have smaller roots,
and the smaller roots
have tiny root hairs.

The tangle of roots
ties up the soil
and takes in water
and minerals
for the plant.



Do you want to see roots grow?

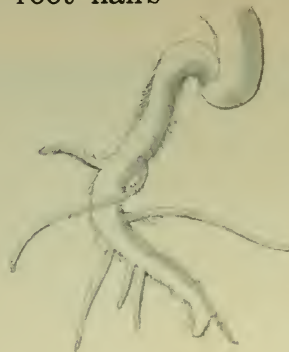
Cut a piece of paper towel
to fit the bottom of a plastic dish.
Wet the paper.
Pour all the extra water out and
scatter ten radish seeds on it.
Cover the dish.



In few days
watch a fat little root
poke its way
out of each seed. Then

MAGNIFY

and — later — see thousands of root hairs
growing out from the roots.

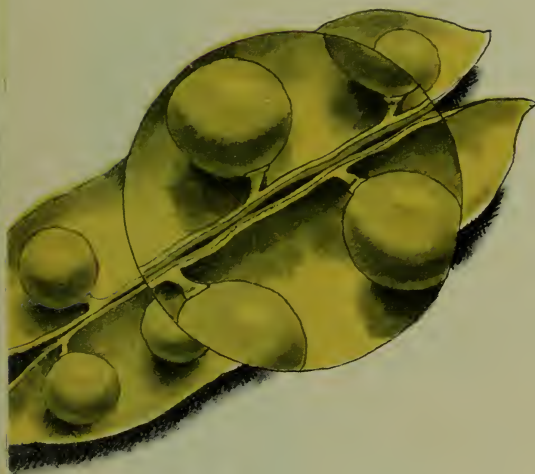


Peas in Pod

Why do peas
have a small, round mark
on one side?

Get a fresh pea pod and
hold it up to the light.
Can you see
the peas inside?





Split the pod open
along the edge
opposite from the peas and

MAGNIFY.

Each pea is attached to the pod
by a stalk.

Pull one pea out of the pod and

MAGNIFY.



Do you see a round scar
on the pea
where it was attached to the stalk?

Look at the end of the stalk.
Look at the scar on the pea.
Do they match?

Pull all the peas out of the pod
but leave the stalks.

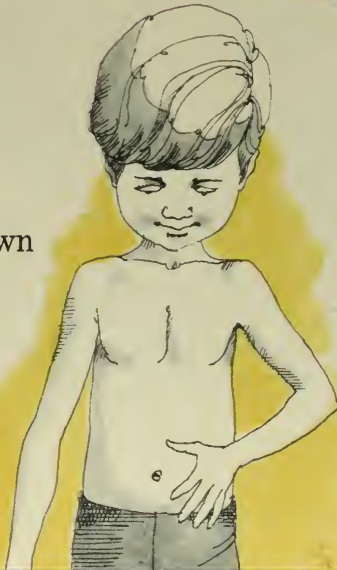
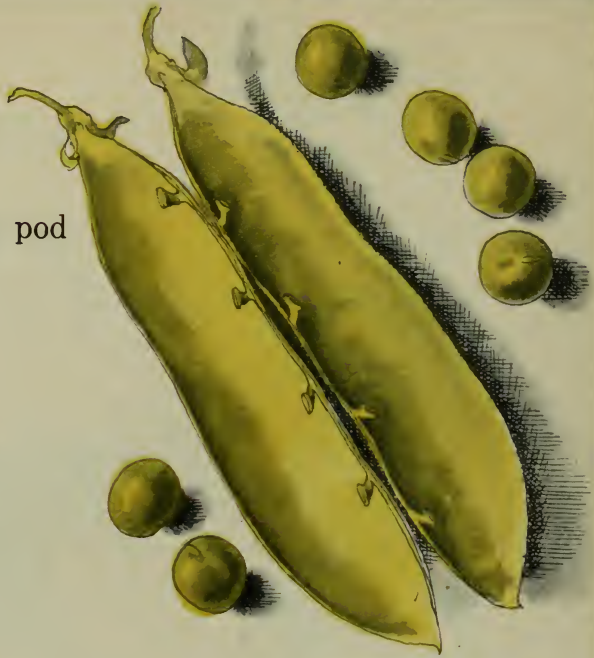
What does a stalk do?
Of course it holds the pea
nicely in the pod.
It does something else too.

Inside the stalk
are many pipes
that carry sugar and water
into the growing seed.

Inside the pea seed
is a tiny plant.
Peel the covering from a large pea.
See if you can find the plant
between the two halves and

MAGNIFY.

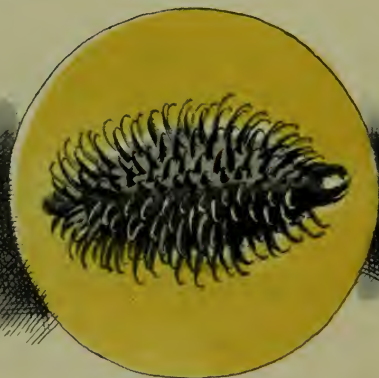
Do you have a scar of your own
where you were attached
inside your mother
before you were born?





Seeds of the Cocklebur

How can the cocklebur seedpod
hold on so tight
to your coat?



MAGNIFY

and see its many sharp hooks.
When a person
or a rabbit
or a deer
brushes against a cocklebur plant,
the seedpod hooks on
and gets a free ride.



Later the seedpod falls off
far away
from the cocklebur plant,
perhaps in a place
where there is soil.

Next spring
a new cocklebur plant
may grow
from a seed inside the pod.

Find out
how other seeds
hitch a ride.

Walk through a field of weeds.
Look at your clothing.
Find the seeds and

MAGNIFY.



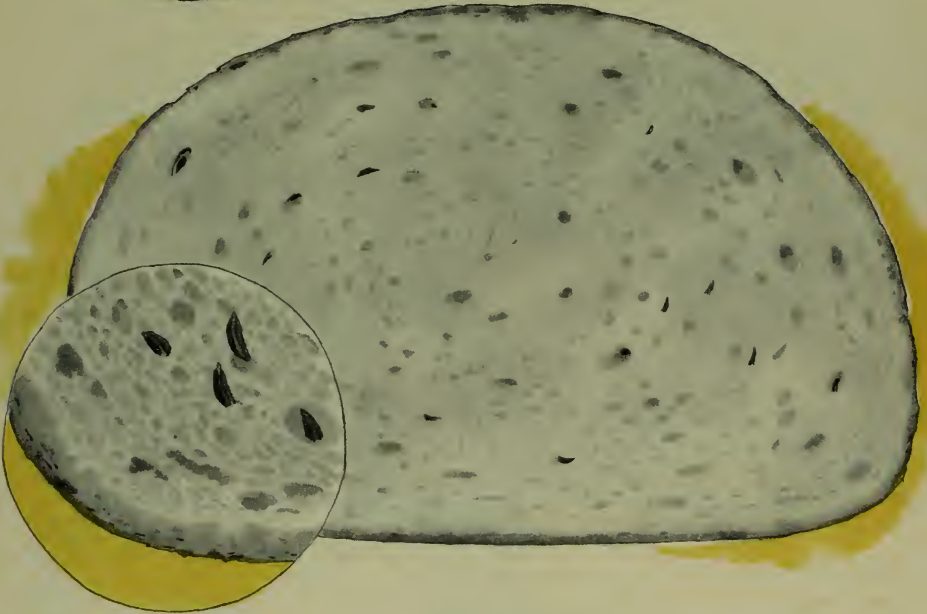
Spice in Your Food



What is spice?

Some spices are seeds.

Do you like rye bread with seeds?



MAGNIFY

a slice of rye.

Find the banana-shaped,
brown-striped

caraway seeds

good for the flavor of rye bread,
biscuits and pies,
cheeses and noodles.



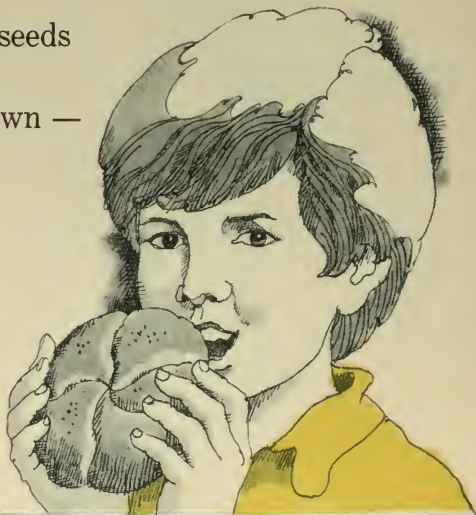
Do you like rolls with seeds?

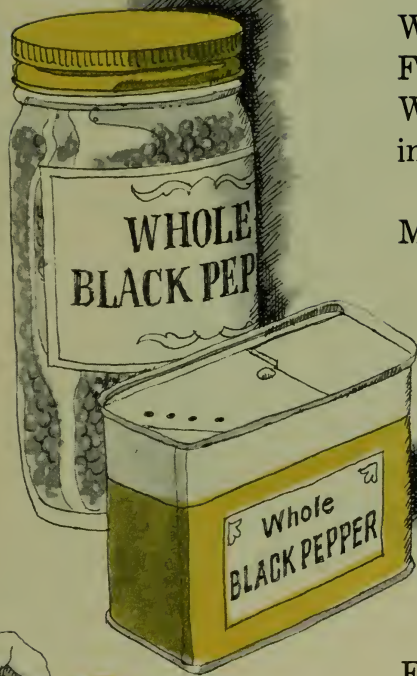
MAGNIFY

and see the bean-shaped poppy seeds
that are on some rolls.

Some blue, some pink, some brown —
all with a honeycomb coat.

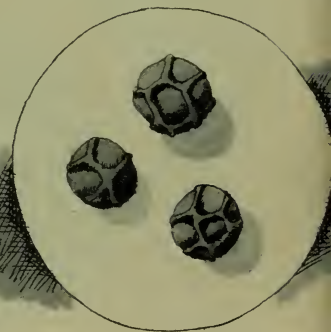
They give rolls
a nutty, crunchy taste.





Where does pepper come from?
Find a jar called
Whole Black Pepper
in your kitchen and

MAGNIFY.



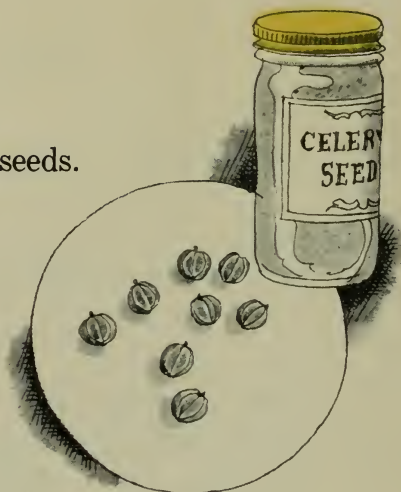
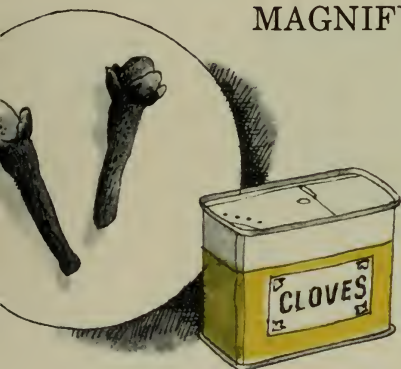
Each seed is like a tiny basketball
with a wrinkled cover.



Grind the seeds in a pepper mill
and now you have
fresh ground pepper.

Many other spices are seeds.
Look for seeds of
cloves and celery,
mustard and dill
in the spice jars
in your kitchen and

MAGNIFY.



Some spices are the dried leaves of plants.
People call these herbs.

MAGNIFY

sweet rosemary
and see
its pine-like,
needle-shaped leaves.



MAGNIFY

basil
and find its broken, dried leaves.



Find other leaves
in the herb jars in your kitchen —
bay leaf, mint, and oregano,
parsley, and thyme — and

MAGNIFY.

Some spices come from other plant parts —
stems, roots, and fruits.
But all
make food tastier.



Color in Your Eyes

What color are your eyes?

Look at one in a mirror and

MAGNIFY.



Hold the magnifying glass
between your eye and the mirror.

Move the magnifier back and forth
until you can see your eye clearly,
or
just look at your eye in a magnifying mirror.

Are your eyes brown or blue,
green or gray or black,
or some other color?



Look carefully at the circle of color
in your eye.
It is called the iris.

Are there specks of other colors
in your iris?
Did you think that your eyes
had just one color?

Look at the eye of a friend
through a magnifying glass.
What colors do you see
in your friend's iris?



The center of everyone's eyes
is black
because it is really a round opening
into the dark inside
of the eye.

This opening is called the pupil.
It grows larger when you go into a dark room
to let more light into your eye.

What do you think happens to the pupil
when you run out
into the bright sunlight?





Prints from Your Fingers

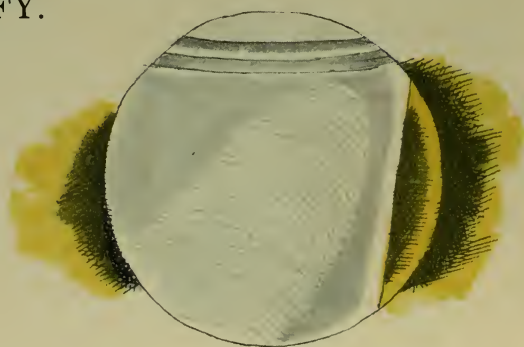
What makes a fingerprint?

First make a fingerprint
with your thumb.

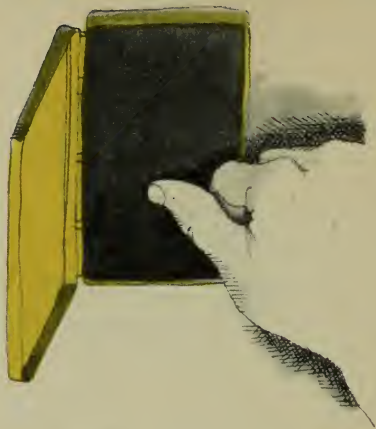
If your thumb is sweaty and oily, that's fine.
Otherwise rub it on your nose
to pick up some oil.

Then press your thumb
on something smooth and shiny
like a clean, dry drinking glass
or a mirror and

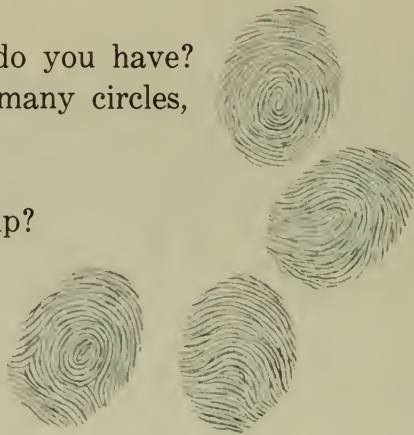
MAGNIFY.



Do you see a print?
To make a better print,
press your thumb on an ink pad
and then on a piece of paper.

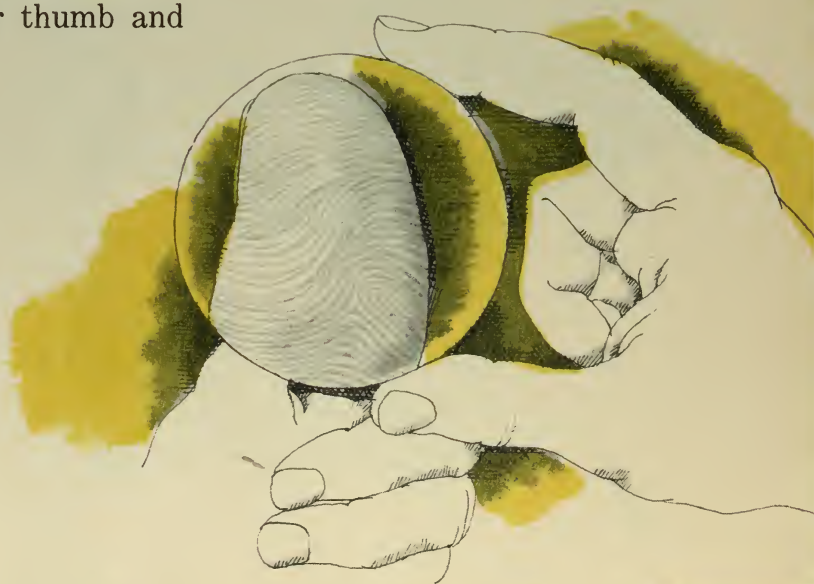


What kind of a print do you have?
Is it a racetrack with many circles,
or a hairpin turn,
or a little hill,
or all of these mixed up?



What made the print?
Look at your thumb and

MAGNIFY.



Do you see
many tiny ridges
like the ones in your thumbprint?

Look at your other fingers.
Are they like your thumb?

All around the house
there are telltale fingerprints.
Are all of them yours?

A fingerprint is something
that is your very own.
It always stays the same.

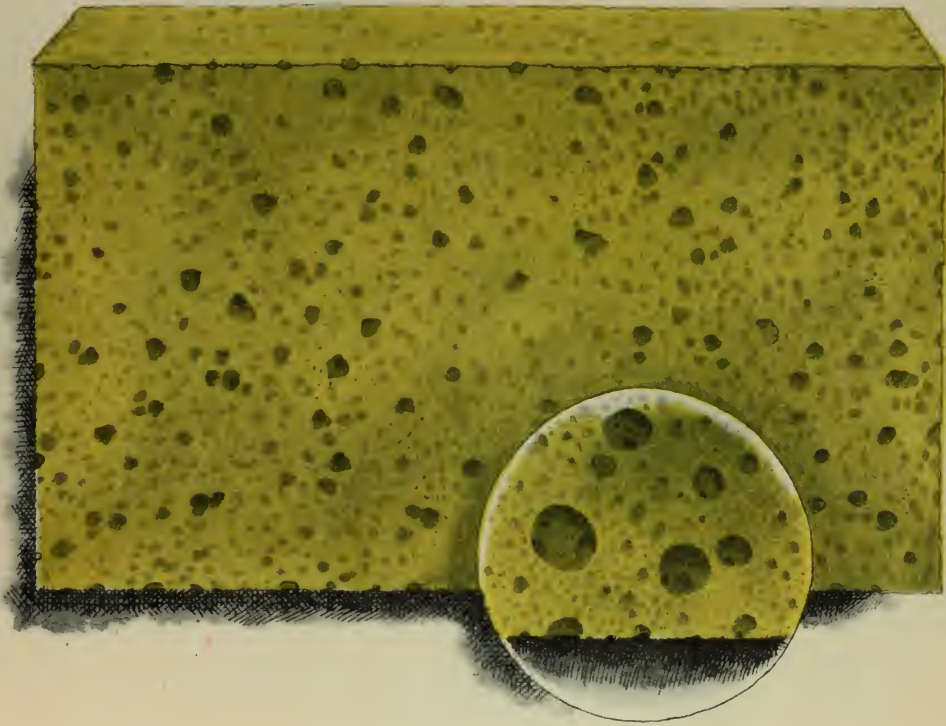
No other person in the world
has a fingerprint
just like yours.



Spaces in Sponges

Why is a sponge
so good
for soaking up water?
Get a sponge and

MAGNIFY.



See the many spaces —
a few large ones,
thousands of tiny ones —
a honeycomb of air spaces.

Pour a little water
on part of the sponge and

MAGNIFY.



Watch the water
soak slowly
into the many openings.

Turn the sponge upside down.
Does it hold the water without dripping?

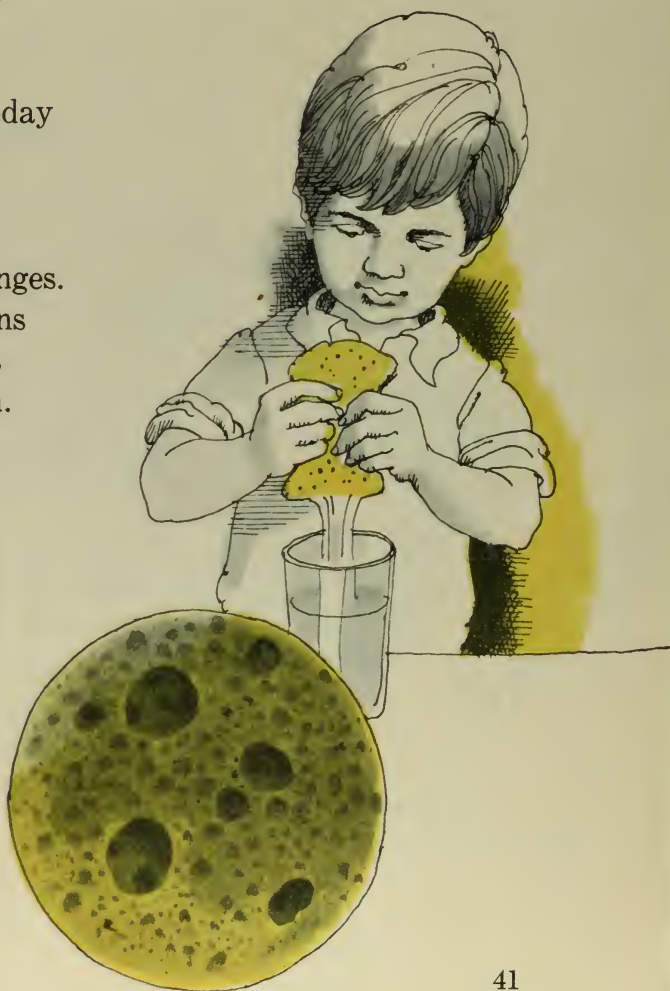
Now squeeze the water out and

MAGNIFY.

The spaces are empty again,
ready for more water.

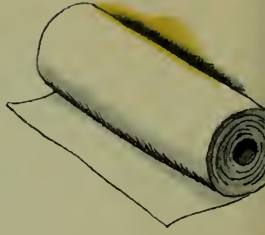
Most sponges used today
are man-made.

Some are natural sponges.
These are the skeletons
of the sponge animals
that live in the ocean.



Threads in Paper

What is paper made of?



Tear a small piece off a paper towel and
MAGNIFY.

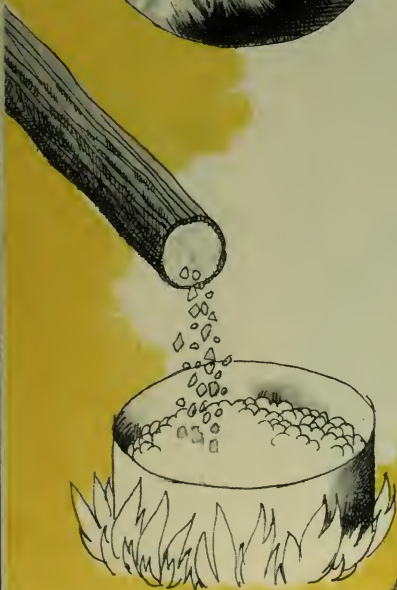
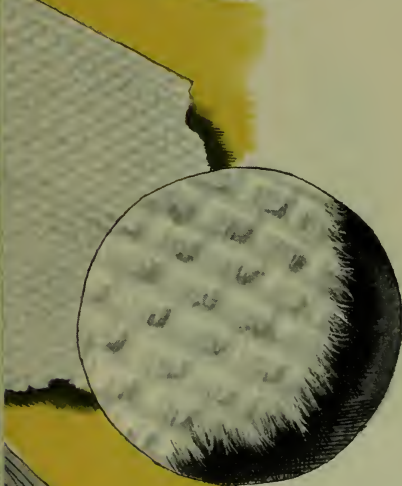
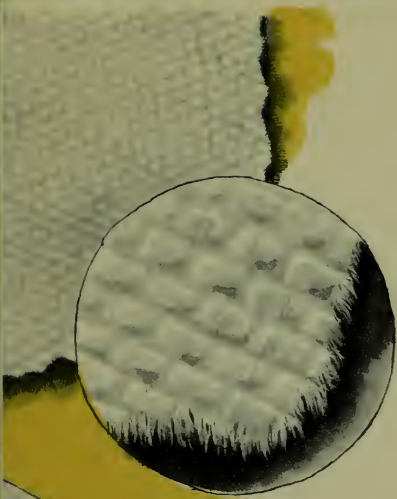
Look at the torn edge.
Do you see many threads?
Tear again.

Do you see threads on the new edges?

Millions of threads
tangled together
make a flat sheet of paper.

Where do the threads come from?
They are shreds of wood
called wood fibers.

Wood from trees is chopped and cooked,
spread out and dried
into flat sheets of paper —
paper towels and newspaper,
drawing paper and wrapping paper —
almost all kinds of paper.



Light in a Bulb

What lights up
in a flashlight bulb?

Look through the glass of a flashlight bulb
and

MAGNIFY.



Do you see a thin wire
coiled like a spring?

Now switch on the flashlight.
What part of the bulb lights up?
Do you see the coil gleam brightly?

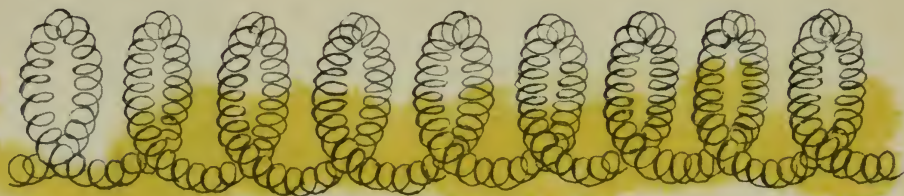
The coil is a long wire
twisted to fit
into a small space.

When electricity from the batteries
goes through,
it gets hot
and makes a bright light
inside its glass home.



Most electric bulbs have a coil like this.
It is called a filament.

In some bulbs,
such as the one in the lamp in your room,
the coils have smaller coils
to make a brighter light.



Secret Letters on Coins

There are secret letters
on coins.

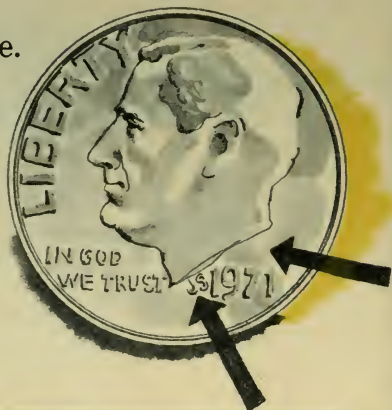
MAGNIFY

a shiny new dime.
Can you find
the secret letters
JS
under President Roosevelt's neck?

What do these letters mean?
They are the initials of the sculptor
who designed the dime.
His name is John Sinnock.

Find the year the dime was made.
Over the date do you see
the letter D?
D stands for Denver,
the place where the dime was made.

If there is no letter there,
the dime was made
in Philadelphia.



MAGNIFY

a shiny new nickel.

Find FS under President Jefferson.

These letters are for the sculptor,
Felix Schlag.



Is there a D near the date?

You know what that means.

MAGNIFY

a new quarter.

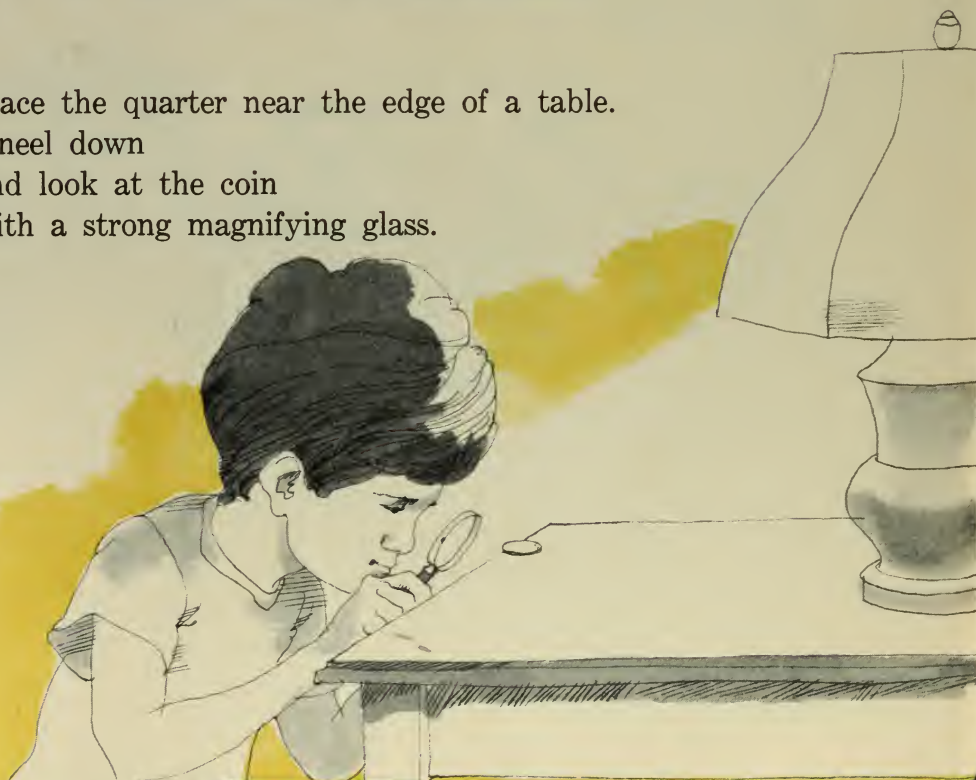
It is very hard to find the secret letters.

Place the quarter near the edge of a table.

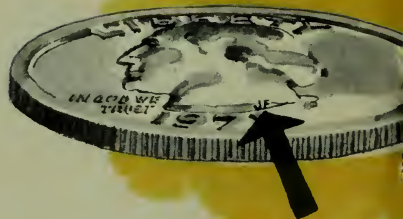
Kneel down

and look at the coin

with a strong magnifying glass.



Look at the coin
from just above its edge.



Find the letters JF
under George Washington's neck,
just above the date.
These are the initials of the sculptor,
John Flanagan.

See if you can find secret letters
on other coins —
pennies and half dollars
and old coins.





What can you see

with a magnifying glass?

Use the magnifying glass in this book



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